

ART. V.—*Revision of the Genera of Ledidæ and Nuculidæ of the Atlantic Coast of the United States*; by A. E. VERRILL and KATHARINE J. BUSH.

(Brief Contributions to Zoölogy from the Museum of Yale University, No. L.)

A SOMEWHAT extended study of the series of deep-sea bivalves belonging to these families, dredged off our coast by the U. S. Fish Commission, from 1872 to 1887, has compelled us to revise the known genera and subgenera and to propose several new groups. In view of an unexpected delay in the publication of the report upon these families, which had been completed and fully illustrated, it seemed desirable to publish a brief preliminary account of the classification adopted.

These families are often united by modern malacologists under a single family (Nuculidæ), while others regard them as distinct. They are certainly closely related anatomically, as well as by the structure of the shell. Thus all the members of both families have a single pair of simple "foliobranchiate" (or protobranchiate) gills; two pairs of large labial palpi, the outer ones furnished with long extensile labial tentacles; a large muscular foot with an expanded, concave, terminal disk, adapted for rapid motions in jumping and swimming, as well as for creeping; and all have two series of transverse teeth on the hinge-margin. The peculiar structures of foot and gills appear together elsewhere only in the family Solemyidæ, which is evidently a related group, though it lacks hinge teeth. As these three families have gills of a peculiar and simple structure, each one consisting of two rows of flat lamellæ, attached to a single stem, they have recently been regarded as forming a special order (Protobranchiata).

This group is of special interest because of its great antiquity. Large numbers of fossil forms, very closely allied to existing genera and species, occur even in Silurian and Devonian formations.

Thus the common living genera *Nucula* and *Leda* are represented by numerous Devonian species, many of which cannot be separated from the recent forms, even as subgenera, by any tangible characters. Other species of the same age, referred to *Palæoneilo*, agree in nearly all essential characters with the living genus *Tindaria*. These fossil shells are generally larger and stronger than the corresponding living species. Many palæozoic genera which are now extinct were as highly organized and as much specialized as their living allies.

The thin-shelled, strongly siphonate genera, such as *Yoldia*, *Yoldiella*, etc., do not appear so early in geological time and

may be regarded as more modern specializations of the Leda-like forms. They are also the forms that swim and jump with the greatest activity. Therefore the thin and light character of their shells may be regarded as having been secondarily acquired, partly in consequence of their active movements, in which a heavy shell would be disadvantageous, and partly because the development of long siphons enables them to live concealed, much of the time, beneath the surface of the soft mud in which they generally live. In *Solemya* the shell is still lighter and thinner, in accordance with more developed swimming habits, combined with burrowing when at rest. Such forms as *Nucula* and *Tindaria*, which have no siphon tubes, must live at or near the surface of the mud over which they creep with their large expanded pedal disk. (Fig. 15.) These have for their protection comparatively solid shells, similar to those of palæozoic species, in form, texture, and sculpture.

The family Nuculidæ differs from Lediæ mainly in having no siphon tubes, the mantle edges being completely disunited. The Lediæ are remarkable for the great variations in the structure of the hinge-teeth, ligament, cartilage, and mantle, as well as in the form of the shell. The pallial sinus may be wanting or well-developed. Some genera have long united siphons (*Yoldia*); some have shorter ones, more or less separated (*Leda*); while in *Tindaria* there is no true siphon, but only an efferent orifice differentiated. The ligament may be wholly external, as in *Malletia*, *Tindaria*, etc., or it may be rudimentary and replaced by an internal cartilage or "resilium"; or both may coexist in varying degrees of development and degeneration. The hinge-teeth may be very numerous and regularly v-shaped, in each series, or they may be comparatively few and irregular, sometimes becoming oblique and lamelliform (*Silicula*). The beaks generally turn backward (*Yoldia*, *Leda*, *Nucula*), but in *Malletia*, *Tindaria*, and some other genera, they turn forward. On this account, when there is neither pallial sinus nor external ligament, it is often difficult, if not impossible, to tell which is the anterior end of the shell, without the soft parts. Hence many fossil and some recent species have possibly been reversed in the descriptions. Thus many of the palæozoic species referred to *Nucula* are described as having the beaks turned forward, the larger end of the shell being considered posterior; but in modern *Nuculæ*, the beaks turn backward, and the shorter end is posterior. Many of the deep sea species with small, thin shells show no distinct muscular nor pallial scars, which increases this difficulty. When a differentiated external ligament is present, we have assumed that it is posterior to the beaks (opisthodontic),

though a narrow extension usually runs under and forward of the beaks in a groove. When the shell of a dimyarian bivalve gapes posteriorly, the existence of a siphon may generally be assumed; for otherwise the internal soft parts would be exposed to enemies. The existence of a posterior rostrum or a protrusion of the posterior margin defined by an inferior emargination indicates the existence of a siphon, or at least an anal tube, but these organs may exist without such modifications of the shell. If these rules be applied to palæozoic forms we must conclude that the rostrate and subrostrate forms of *Palæoneilo*, etc., had some sort of a siphon, and therefore were not *Nuculidæ*, as now restricted.

Family NUCULIDÆ.

We have included *Nuculina* (D'Orb.) in the *Nuculidæ* with some doubt, because authors differ as to its structure. It is said that its ligament is wholly external; if so, it should, perhaps, form a distinct subfamily. Its anatomy is unknown. Fischer places it in the *Arcidæ*, near *Limopsis*, but it has no median ligamental area.

Subfamily GLOMINÆ, nov.

Ligament thick, elongated, attached for most of its length to the inner surface of the posterior hinge-plate and running forward in a narrow groove beneath the beaks, so that its anterior portion is external and the thickened posterior portion is partly internal. No pallial sinus. Animal not known.

This group includes, so far as known, only the genus *Glomus* Jeffreys, which has been referred by several writers to the *Arcidæ*, and by others to the *Ledidæ*, from both of which it differs widely. Its relations to the *Nuculidæ* are somewhat uncertain, owing to our ignorance of the soft parts. In the form and position of the ligament it differs entirely from all other genera of *Nuculidæ* and *Ledidæ*.

Glomus Jeffreys. Figures 1, 2.

Glomus Jeffreys, *Annals, Mag. Nat. Hist.*, p. 433, 1876; *Proc. Zoöl. Soc. London*, p. 573, pl. xlv, figs. 5, 5a, 1879; Smith, *Report Voy. Challenger, Zoöl.*, xiii, pp. 248-249, pl. xxi, figs. 1-3b, 1885.

Shell thin, smooth, sub-equilateral, rounded at both ends, with the beaks turned forward. No lunule nor escutcheon. Hinge with two series of obliquely transverse teeth; a small lateral tooth.

The following are described species:

G. nitens Jeff., *G. Jeffreysi* Smith, *G. simplex* Smith, *G. inæquilateralis* Smith, *G. Japonicus* Smith.

Family LEDIDÆ. Subfamily LEDINÆ.

Leda Schumacher, 1817. Figure 19. Type *L. rostrata* (Mont.).

This genus has been variously extended and restricted by authors, and several subgeneric and sectional groups have been proposed. In the more extended sense it is scarcely capable of a definition that will distinguish it from *Yoldia*, etc.

We propose, therefore, to restrict it to the typical species, such as *L. cuspidata* Gld., *caudata* Donovan (fig. 19), *pernula* (Müll.), *tenuisulcata* (Couth.) and many others, closely related. These have a long, tapered, bicarinate rostrum, and well-developed siphon tubes, partially united. The palpal tentacles are long, flat, tapered, and arise external to the bases of the outer palpi, which are broad, with slender, acute posterior tips.

Ledella, gen. nov. Figures 13, 18. Type *L. Messanensis* (Seg.).

Junonia Seguenza, Nuculidi terziarie merid. d' Ital., R. Accad. Lincei, i, p. 1175, 1877 (not of Hübner).

This group includes a large number of small species, both living and fossil, in which the shell is rather short, usually ovate or swollen, with a small, acute, or subacute, unicarinate rostrum, situated medially or submedially, and defined below by an emargination or undulation in the postero-ventral margin. The postero-dorsal margin is usually convex. The escutcheon or ligamental area is distinctly defined by the carina, but is not sunken. The chondrophore is usually small but distinct. The siphon tubes are separate, at least in some species.

The following species appear to belong here :

L. seminula (Seg.), *L. Messanensis* (Seg.) (fig. 13), *L. Nicotrax* (Seg.), *L. peraffinis* (Seg.), *L. rectidorsata* (Seg.), *L. confusa* (Seg.), *L. solidula* Smith, *L. semen* Smith, *L. confinis* Smith, *L. inopinata* Smith, *L. prolata* Smith, *L. ultima* Smith, and *L. parva* V. & B.*

Portlandia Morch. Type *P. arctica* (Gray), 1819=*Leda Portlandica* (Hitch.).

We consider this a distinct genus, but would restrict it to the original type. In many respects this genus is intermediate between *Leda* and *Yoldia*. In its closed shell, definite rostrum,

* *Ledella parva*, sp. nov. Figure 18.

Shell minute, smooth, narrow ovate, inequilateral, obtusely rounded anteriorly, slightly rostrate posteriorly with a slight postero-ventral emargination; the short rostrum subtruncate at tip and defined by an inconspicuous ridge. Umbos somewhat swollen, beaks a little prominent and turned slightly backward. Hinge-plate strong with fifteen anterior and nine posterior teeth. Chondrophore rather small, triangular with a distinctly projecting inner margin. Length, 3^{mm}; height, 2^{mm}.

Station 2689, off Martha's Vineyard, in 525 fathoms, 1886.

etc., it agrees more nearly with the former, but in general outline, with the latter.

Yoldia Möller. Figures 12, 16. Type *Y. hyperborea* Torrell.

We propose to restrict this genus to the typical forms, such as *limatula* (Say) (fig. 12), *sapotilla* (Gld.) (fig. 16), *myalis* (Couth.) and many closely allied foreign species.

These have a nearly smooth, compressed, lanceolate, gaping shell, more or less prolonged and tapered posteriorly, with a poorly defined wide rostrum, generally without carinations. The external ligament is marginal, feebly developed, continuous under the beaks, and not much differentiated from the general epidermis. The chondrophore is large, concave, and projects within the margin. The pallial sinus is large and deep. The siphon-tubes and posterior pallial tentacle are long. The palpal tentacles are long and tapered; in life they may extend nearly to the end of the expanded siphon.

Orthoyoldia, gen. nov. Type *Orthoyoldia scapina* (Dall).

Shell oblong, gaping, blunt or rounded at both ends, without distinct rostrum; no carina. Pallial sinus large and broad. Teeth numerous in both series. *O. scapina* (Dall), from off Brazil, and *O. solenoides* (Dall), from the West Indies.

Megayoldia, gen. nov. Figure 17. Type *M. thraciaformis* (Storer).

Shell large, compressed, gaping, with a very short, blunt, indefinite, postero-dorsal rostrum. A low radial ridge, ends in a postero-ventral marginal lobe. A well defined but thin external marginal ligament extends both before and behind the beaks, anteriorly with a supramarginal furrow.

The chondrophore is remarkably large and strong, concave, striated within, and projects much within the margin of the hinge-plate. The pallial sinus is large and deep.

The postero-ventral margin of the mantle forms a pouch-like protrusion, corresponding to the radial ridge. The siphon tubes are long and united; the posterior pallial tentacle is long and slender. The palpi are very large. The palpal tentacles originate from the body wall at the base of the outer palpi; they are long and thick, with a large furrow on one side.

Yoldiella, gen. nov. Figures 3, 4, 11, 14. Type *Yoldiella lucida* (Loven).

This group includes a large number of small, mostly deep-sea species, with glossy, iridescent, ovate, and usually wedge-shaped shells, nearly always having a slight postero-ventral sinuosity,

which feebly defines an obscure, blunt, rostral region, without any definite carination. The shells do not gap, but close tightly, except that at the rostral angle of some species there may be a slight divergence. The internal cartilage, which is often relatively large, occupies a simple notch, which interrupts the hinge margin more or less completely and generally shows externally in a dorsal view; the notch usually terminates within on the inner or inferior surface of the hinge-plate and is often bounded within by a slight ridge. A weak external ligament is present on the postero-dorsal margin. A relatively small, pallial sinus has been observed in several of the species, but is usually indistinct. The siphon tubes, as observed in a few of the species, are slender and united for more than half their length.

The following are some of the species :

Y. lucida (Lovén), *Y. inflata* V. & B.,* *Y. Jeffreysi* (Hidalgo), *Y. lenticula* (Möller), *Y. frigida* (Torell), and *Y. Hoylei* (Smith).

Microyoldia, gen. nov. Figures 5, 6. Type *M. regularis* (V.).†

Shell small, tightly closed, veneriform, with the anterior end the shorter, with the beaks turned forward. A posterior marginal ligament in a distinct groove, continued under the beaks. Hinge-plate and teeth rather strong; anterior series of teeth the shorter, forming a marked angle with the posterior series. Internal cartilage supported by a relatively large and strong chondrophore, placed on the surface of the hinge-plate, distinctly behind the beaks and at the proximal end of the posterior series of teeth. Pallial line indistinct.

The curious little shell for which this genus is proposed is remarkable for its form and the internymphal position of the cartilage and chondrophore, as well as for its few short teeth. If we are correct in our conclusions as to the anterior and posterior ends, the beaks turn forward as in *Tindaria*.

Subfamily MALLETINÆ.

Malletia Desmoulins (restricted). Figure 9. Type *Malletia Chilensis* Desmoulins.

We propose to restrict this genus to those species having a nearly smooth, somewhat compressed, oblong or elliptical shell,

* *Yoldiella inflata*, sp. nov. Figures 3, 4, 11.

Shell small, smooth, shining, somewhat iridescent, swollen, rather short, sub-ovate, inequilateral, broadly rounded anteriorly, broad and obtusely subtruncated posteriorly, with a slight angle at the upper extremity. Umbos well-rounded; beaks small, appressed to the margin. External ligament delicate. Hinge-plate moderately broad, with nine to eleven anterior and about ten posterior teeth, separated by the small cartilage pit. Epidermis pale olive-yellow or straw color.

Length of one of the largest specimens, 6^{mm}; height, 4.5^{mm}; thickness, about 3^{mm}.

Found at about twenty stations from south of Georges' Bank to Cape Hatteras, N. C., in 516 to 1608 fathoms, 1883-1886.

† Verrill, Trans. Conn. Acad., vi, p. 228, 1884.

blunt posteriorly, without any definite rostrum or carination. The carinated and rostrated species that have been placed in it will thus be referred to *Neilo* H. and A. Adams. The siphon tubes are long and united nearly to the tips.

The following are some of the known species:

M. Chilensis Desmoulins (Type), *M. obtusa* (Sars) Mörch, *M. pallida* Smith, *M. arrouana* Smith, *M. Dunkeri* Smith, and *M. Bellardii* Seguenza

The subgenus *Pseudomalletia*, proposed by Fischer for *M. obtusa*, was based on an erroneous description of the siphon tubes.

Neilo Adams. Type *N. Cumingii* Adams.

The type-species of this genus has an oblong shell, with a straight postero-dorsal margin and a well defined rostrum, bounded beneath by a pronounced furrow and a marginal indentation, while more ventrally the margin protrudes somewhat, the pouting of the margin corresponding with special lobes of the margin of the mantle. The type-species is concentrically grooved, but *N. goniura* Dall is smooth or nearly so.

Neilonella Dall. Figures 7, 8, 22. Type *N. corpulenta* Dall.

Saturnia Seguenza, *Nuculidi terziarie merid. d'Ital.*, R. Accad. Lincei, i, p. 1178, 1877 (non Schrank, 1802).

Leda (section *Neilonella*) Dall, Bull. Mus. Comp. Zoöl., ix, p. 125, 1881; xii, p. 254, 1886 + *Saturnia*, op. cit., p. 253.

Shell ovate, with both ends obtuse; the posterior end somewhat longer than the anterior, without any distinct rostrum or carina. Exterior usually concentrically grooved. Ligamental area not defined. Beaks usually prominent and turned inward and slightly backward. External ligament well-developed; it extends under and before the beaks in a distinct groove, more prominent behind. Internal cartilage very minute or nearly abortive, occupying a slight notch in the medial dorsal margin, external to the series of teeth, which proximally become minute and are interrupted only by a small, thin edentulous space. Pallial sinus small. Siphon tubes short. Labial palpi large, broad, crescent-shape, with long tentacular appendages. Gills small, triquetral.

The following species appear to belong here:

N. corpulenta Dall (type), *N. quadrangularis* (Dall), *N. sericea* (Jeffreys), *N. pusio* (Phil.), and *N. subovata* V. and B.*

* *Neilonella subovata*, sp. nov. Figures 7, 8, 22.

Yoldia sericea Jeff. var. *striolata* Verrill, Trans. Conn. Acad., vi, p. 226, 1884.

Shell somewhat swollen, subovate, sculptured with regular concentric sulcations and ridges, usually faint or obsolete posteriorly, and with a number of faint radiating striae posteriorly. Beaks curved strongly inward and a little backward. Hinge margin rather strong, the series of teeth interrupted by a small edentulous space; eleven or twelve anterior and fifteen or sixteen posterior teeth. External ligament well-developed, dark brown, conspicuous behind the beaks, and extending a

Subfamily TINDARINÆ, nov.

Cucullellinæ (pars) Fischer, Man. Conch., p. 981. *Ctenodontidæ* Dall (pars), Trans. Wagner Free Inst., iii, p. 515, 1895.

In this group the shell is short-ovate or veneriform, with the posterior end the longer. The beaks turn forward. The internal cartilage is wanting. The external ligament is well-developed and prominent. The teeth are numerous, v-shaped, the two series are frequently continuous proximally. There is neither pallial sinus nor true siphons. The mantle is broadly open ventrally, but there is a separate anal or efferent orifice, surrounded by small sense papillæ. The palpi are large, with long slender appendages. Foot with a large, terminal, crenulated disk.

This group agrees with *Malletinæ* in having no internal cartilage, but there are, in the latter, well-developed siphons and a pallial sinus.

Numerous Palæozoic species referred to the genus *Palæoneilo* probably belong to or near this group. Some of the species* from the American Devonian rocks can hardly be distinguished from *Tindaria* by any important structural characters. It is probable that *Nuculites* and several related genera also belong to this division, for they have an external cartilage and no chondrophore. In these genera the plain transverse teeth are very numerous and more simple than in the modern genera, seldom showing any trace of the acute v-shaped form.

Mr. Dall has proposed the family *Ctenodontidæ* to include the extinct genera above named and others, but it is doubtful whether *Ctenodonta* itself belongs here. Zittel and others refer it to Arcidæ.

Tindaria Bellardi. Figures 10, 20, 21. Type *T. arata* Bellardi.

Several recent writers on these shells have regarded *Tindaria* as a subgenus of *Malletia*. In reality they form two widely diverse genera. In typical *Tindariæ* the shell is swollen, ovate, short, or subcordate, without any rostration, and with prominent umbos, with the beaks turned forward. In fact, the shells may be described as veneriform. The surface is usually concentrically grooved. The series of teeth are often continuous medially. There is no pallial sinus.

The following are some of the known species :

T. arata Bellardi, *T. solida* Seguenza, *T. cytherea* Dall = *T. veneriformis* Smith, *T. amabilis* Dall, *T. virens* Dall, *T. acinula*

little in front of them. Cartilage minute, marginal. Epidermis without much luster, either greenish yellow or light straw-color. Muscular impressions faint; sometimes a distinct angular pallial sinus is visible.

Length, 6.5^{mm}; height, 4.6^{mm}; thickness, about 3.5^{mm}.

Found at many stations from off George's Banks to Cape Hatteras, in 125 to 1731 fathoms, 1883-1887.

* For examples see *P. constricta* Hall, *P. plana* Hall in Palæontology of New York, v, pt. I, pp. 333, 334, pl. xlviii, figs. 1-28, 1885.

Dall, *T. cuneata* Smith = *T. Smithii* Dall, and *T. callistiformis* V. and B.* All except the first two are from American waters.

Subgenus *Tindariopsis*, nov. Type *T. agathida* (Dall).†

This division is proposed for those species which have a short rostrum, defined by a radial ridge and a furrow. The type has a well-marked dorsal ligamental furrow and a small notch or "socket" under the beak for a specialized part of the ligament.

It is uncertain whether it has a siphon and pallial sinus. In case these are present, it should form a distinct genus and be referred to *Malletinæ*.

Analytical table of recent subfamilies, genera, and subgenera of Ledidæ and Nuculidæ here adopted.

- A. Shell not gaping, short-ovate, subtrigonal, or rounded; posterior end without a rostrum; beaks usually curved backward; no siphon tubes nor pallial sinus.
 - Nuculidæ d'Orb.
- B. Shell more or less trigonal, usually oblique; posterior end usually shorter; beaks turned backward.....Nuculinæ.
- c. Teeth numerous, transverse, v-shaped, forming two convexly arched or angulated series; a distinct median chondrophore; no lateral teeth.....Nucula Lam.
- cc. Teeth few, not forming long series; a long lateral tooth in each valve; no median chondrophore.....Nuculina.
- BB. Shell rounded, nearly equilateral; beaks turned forward; teeth oblique, in two series; ligament in an elongated posterior internymphal groove.....Glominæ, nov.
- AA. Shell ovate, oblong or lanceolate; posterior end generally the longer and usually more or less rostrated; siphon tubes and pallial sinus generally present.....Ledidæ.
- C. Cartilage or resilium present, not closely united with the external ligament.....Ledinæ.
 - a. Resilium supported by a definite concave chondrophore extending inward to or beyond the inner edge of the hinge-plate.
 - b. Shell not gaping unless at the end of the rostrum.
 - c. Shell distinctly rostrated and carinated posteriorly.
 - Leda Schum. (sens. ext.)

* *Tindaria callistiformis*, sp. nov. Figures 10, 20, 21.

Shell small, stout, thick, regularly ovate, sculptured with very regular fine concentric grooves. Umbos swollen, beaks prominent, curved strongly inward and somewhat forward. Hinge-plate with a continuous series of teeth, about eight before and twenty-three behind the beaks. Ligament groove rather deep, submarginal, both before and behind the beaks. Color pale yellowish brown, internally glossy, bluish white.

Length, 8^{mm}; height, 6^{mm}; thickness, about 4.5^{mm}.

One living specimen, station 2566 off Chesapeake Bay, in 2620 fathoms, 1885.

† *Malletia* (*Tindaria*) *agathida* Dall, Proc. U. S. Nat. Mus., xii, p. 252, pl. xiii, fig. 10, 1889.

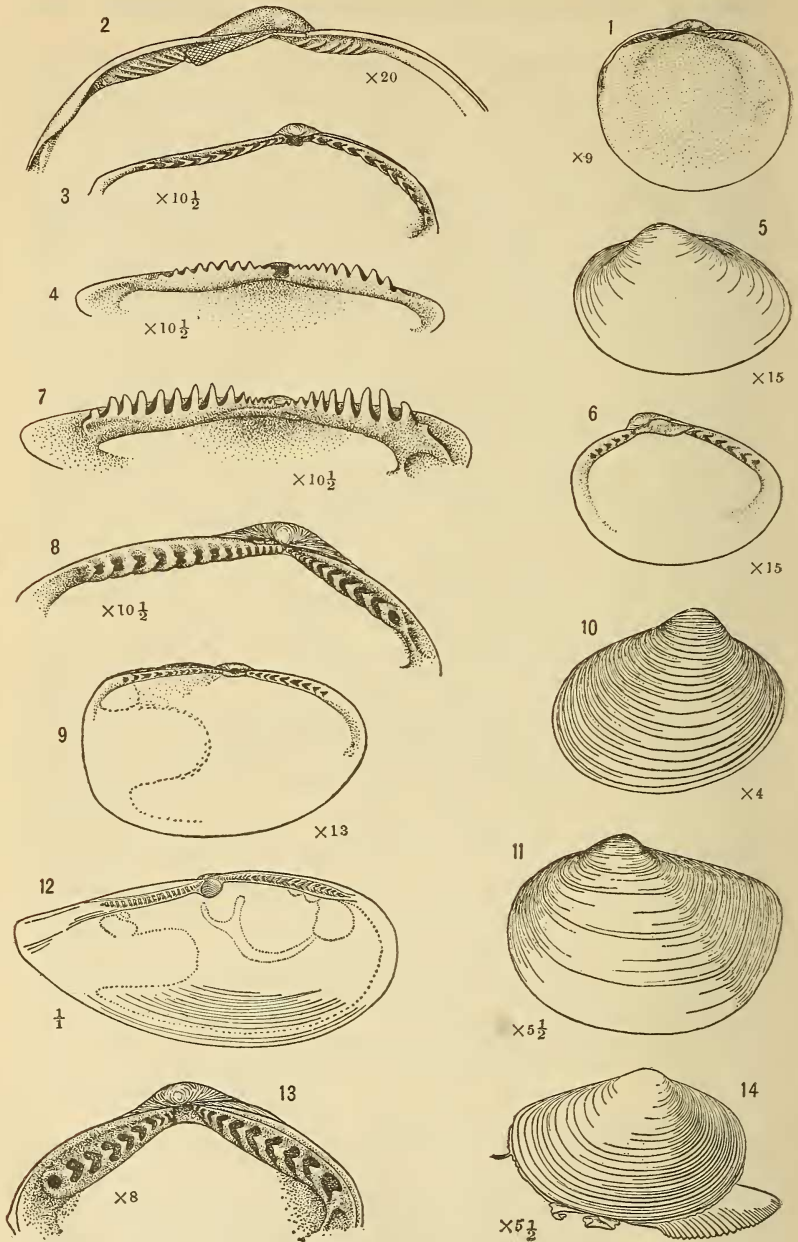


Fig. 1.—*Glomus nitens*, left valve. Fig. 2.—Hinge of same. Fig. 3.—*Yoldiella inflata* V. and B., hinge of left valve. Fig. 4.—Profile of same. Fig. 5.—*Microyoldia regularis* (V.) left valve. Fig. 6.—The same, right valve. Fig. 7.—*Neilonella subovata* V. and B., hinge of left valve, profile. Fig. 8.—The same, front view. Fig. 9.—*Malletia obtusa*, left valve. Fig. 10.—*Tindaria callistiformis* V. and B., right valve. Fig. 11.—*Yoldiella inflata* V. and B., left valve. Fig. 12.—*Yoldia limatula*, left valve. Fig. 13.—*Ledella messanensis* variety, left valve. Fig. 14.—*Yoldiella lucida*, from life, soft parts partly expanded. Figs. 12 and 14 are by J. H. Emerton; all others by A. H. Verrill.

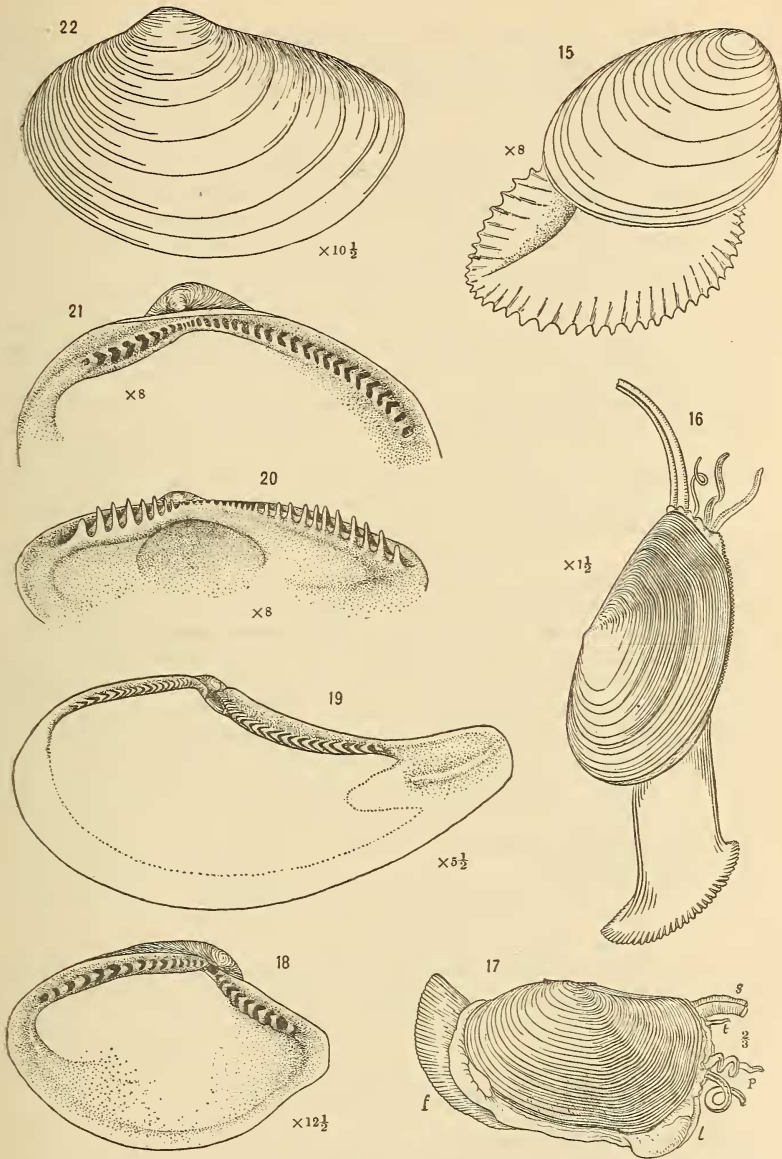


Fig. 15.—*Nucula proxima*, with expanded foot. Fig. 16.—*Yoldia sapotilla*, from life, with expanded soft parts. Fig. 17.—*Megayoldia thraciceformis*, from life; *f*, foot; *l*, pallial pouch; *t*, pallial tentacle; *p*, palpal tentacles; *s*, siphon. Fig. 18.—*Ledella parva* V. and B., right valve. Fig. 19.—*Leda coudata*, right valve. Fig. 20.—*Tindaria callistiformis* V. and B., hinge of right valve, nearly in profile. Fig. 21.—The same, front view. Fig. 22.—*Neilonella subovata* V. and B., left valve. Figs. 15, 16, 17 are by J. H. Emerton; all others by A. H. Verrill.

- d.* Shell elongated and tapered posteriorly, rostrum long, bicarinate, blunt, ligamental area or escutcheon long and well-defined; pallial sinus and siphon tubes developed *Leda* (sens. rest.)
- dd.* Shell shorter, swollen, ovate or oblong, posteriorly not much elongated; rostrum short, usually acute, unicarinate.
- e.* Shell ovate, rostrum small acute; ligamentary area or escutcheon distinctly bordered by a carina.
- f.* Rostrum short, sub-acute, sub-medial, defined below by a ventral-sinuosity or emargination.
Ledella, nov. = *Junonia* Seguenza.
- ff.* Rostrum short, dorsal, not defined below by a ventral sinuosity; postero-dorsal margin concave; escutcheon sunken *Jupiteria* Bellardi.
- ee.* Shell oblong, angular, subtruncate, rostrum short, angular, dorsal, defined below by a marginal sinuosity; escutcheon well defined *Portlandia* Mörch.
- cc.* Shell not rostrated, small, ovate or elliptical, rounded at both ends, anterior end the shorter, no carina, lunule, nor escutcheon; cartilage posterior, internymphal.
Microyoldia, nov.
- bb.* Shell oblong or lanceolate, compressed, nearly plain, more or less gaping at both ends; rostrum not well defined; pallial sinus large and broad; tubes long, united.
- g.* Teeth transverse, v-shaped, numerous, in two long series; chondrophore large, concave, projecting strongly inside the hinge-plate *Yoldia* Möller (sens. ext.)
- h.* Shell large, compressed, rounded anteriorly, broadest posteriorly with a postero-ventral protrusion and radial ridge; rostrum short, broad, poorly defined; external ligament well-developed, prominent both sides of the beaks, occupying a continuous furrow; no lunule nor escutcheon *Megayoldia*, nov.
- hh.* Shell lanceolate or long-ovate, posteriorly narrowed and somewhat elongated, more or less sinuous below; rostrum slightly defined, smooth or slightly carinate; external ligament feebly developed... *Yoldia* (sens. rest.)
- hhh.* Shell oblong, smooth, plain, blunt and rounded at both ends, without any distinct carina, sinuosity or rostrum.
Orthoyoldia, nov.
- hhhh.* Shell thin, compressed, narrow lanceolate or long elliptical, nearly equilateral, and gaping at both ends.
Adrana H. and A. Ad.
- gg.* Shell thin, oblong, inequilateral, blunt at both ends, not rostrated nor carinated; teeth few, lamellar, very oblique. Type *S. fragilis* Jeffreys... *Silicula* Jeffreys.
- aa.* Shell small, nearly plain, not much rostrated nor carinated; cartilage without a prominent chondrophore, situated in a notch in the hinge-margin, interrupting the series of teeth.

- l.* Teeth v-shaped, numerous in both series.
m. Shell oblong or subovate, blunt posteriorly, with a slightly sinuous margin, sometimes subrostrate, not carinate. Yoldiella, nov.
mm. Shell regularly ovate, rounded at both ends, not sinuous, nor carinate, (?) no pallial sinus Sarepta A. Ad.
ll. Shell short-ovate, not sinuous nor angulated; teeth few, oblique, not regularly v-shaped. Type *P. ovatus* Seguenza Phaseolus Seg.
CC. No true internal cartilage; ligament well-developed, often prominent behind the beaks. Beaks usually turned forward.
D. Siphon tubes and pallial sinus present; teeth mostly v-shaped, in two long series, often interrupted by a median edentulous space Malletinæ.
o. Siphon tubes long; pallial sinus large; shell elongated, gaping.
p. Shell oblong or elliptical, blunt posteriorly, not distinctly rostrate; series of teeth unequal; those in the anterior series fewer Malletia Desm.
pp. Shell long-ovate or oblong, broadly angulated and sinuous posteriorly; distinctly rostrate and carinate; two series of teeth nearly equal Neilo H. and A. Ad.
oo. Siphon and pallial sinus small, shell ovate, not gaping; a rudimentary marginal resilium Neilonella Dall.
DD. Shell short-ovate or subcordate, closed at both ends; umbos prominent; ligament entirely external; series of teeth generally continuous Tindarinæ, nov.
s. Shell regularly ovate, grooved, without rostrum or carina; beaks turned forward; no pallial sinus. Tindaria Bellardi.
ss. Shell ovate, with a distinct posterior sinuosity and a short rostrum Tindariopsis, nov.